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For: MEASURING PROBE AND LIVING BODY OPTICAL MEASURING DEVICE

STATEMENT RE: TRANSLATION

Commissioner for Patents
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Sir:

I, Masashi Tsukamoto, state that I am familiar with Japanese and English languages and that the attached translation is an accurate English translation of the Japanese Patent Application No. 2003-2767, filed in Japan on July 18, 2003, and for which priority has been claimed in US Application Serial No. 10/538,236 as one of the priority documents of PCT/JP03/15880 of which US application Serial No. 10/538,236 is a 371.

By: Masashi Tsukamoto Date: November 10, 2009

[Detailed Description of the Invention]

[Field of the Invention]

[0001]

Especially this invention irradiates analyte with measurement light about an organism light measuring device, and is applied to the measurement probe which condenses the light (living body passing beam) which passed through the inside of analyte, and relates to effective art.

[Background of the Invention]

[0002]

The conventional organism light measuring device, for example so that it may be indicated to the patent documents 1, The measurement probe which equips analyte and arranges the object for an exposure, and the optical fiber for detection to a prescribed position, Amount of relative changes deltaCoxy of the oxygenation hemoglobin concentration for every measure point and amount of relative changes deltaCdeoxy of deoxygenation hemoglobin concentration are calculated from a living body passing beam strength signal, It comprised a device main frame which uses the amount of relative changes of the total hemoglobin concentration as total with this amount of relative changes deltaCoxy, deltaCdeoxy, and deltaCoxy and deltaCdeoxy as a living body passing beam intensity image (topography picture) and to which image display is carried out.

[0003]

[Patent documents 1] JP,9-98972,A

[0004]

The optical fiber for an exposure with which a position which a measurement probe derives the light generated from the device main frame to a living body, and is different is irradiated, It comprised a fixed holddown member as for which the shape of a lattice arranges by turns the tip end part of the optical fiber for detection which condenses the living body passing beam which passed the living body, and is derived to a device main frame, and the object for an exposure and the optical fiber for detection to a living body's prescribed position, and a fixing belt which fixes a holddown member to a living body.

[0005]

In the measurement using this conventional organism light measuring device, the object for an exposure and the optical fiber for detection were fixed to the position of a request of a living body by equipping a living body with a holddown member and fixing the object for an exposure, and the optical fiber for detection by the probe holder arranged at this holddown member first. Next, after measuring the living body passing beam strength signal in a living body's resting period, The living body passing beam strength signal in the state where the stimulus was impressed to the living body is measured one by one, Amount of relative changes deltaCoxy of

the oxygenation hemoglobin concentration for every measure point and amount of relative changes deltaCdeoxy of deoxygenation hemoglobin concentration are calculated, The living body passing beam intensity image was generated from the amount of relative changes of the total hemoglobin concentration as total with this amount of relative changes deltaCoxy, deltaCdeoxy, and deltaCoxy and deltaCdeoxy.

[0006]

As a holddown member of a measurement probe, there were some which were formed, for example with comparatively hard construction material, such as a plastic, and there was a holddown member called the shell formed by curving so that the shape might meet the head shape of analyte. The socket etc. which function on this shell as a holding part for fixing each optical fiber for an exposure and for detection are arranged.

[0007]

When the object for an exposure and the tip end part of each optical fiber for detection have especially composition which pushes vertically and hits to the head of analyte, The analyte head was efficiently irradiated with the laser beam which was emitted from the semiconductor laser and derived by the optical fiber for an exposure, and it had become the composition which condenses efficiently the living body passing beam which is a laser beam which passed through the inside of analyte.

[Description of the Invention]

[Problem(s) to be Solved by the Invention]

[0008]

this invention person found out the following problems, as a result of examining said conventional technology.

It is necessary to irradiate the inside of the scalp with the laser beam irradiated from the optical fiber for an exposure uniformly from an irradiation position from the fundamental principle in the conventional organism light measuring device and, and. Since the living body passing beam which passed the inside of the scalp also in the optical fiber for detection needed to be condensed uniformly, the measurement probe was formed so that the object for an exposure and the medial axis of each optical fiber for detection might be arranged almost vertically to the head of analyte.

[0009]

In a therapy which identifies an epilepsy focal position and excises an applicable part like the therapy of epilepsy especially, the position with an exact epilepsy focus needed to be identified.

[0010]

On the other hand, since it is a thing resulting from the functional disorder of the brain which happens spasmodically, in order to identify an epilepsy focal position, the epilepsy needed to

hold the state where analyte was equipped with the measurement probe until an epileptic stroke occurred.

[0011]

However, in order to perform a newborn infant and prolonged measurement, while analytes other than measurement in a seating position or a standing position, such as a side lying position, had gone to sleep, measurement by posture is also needed, and it is anxious for the measurement probe which can be measured even when analytes, such as a side lying position, become width. That is, it is anxious for the measurement probe which can fix an optical fiber to the head of analyte, without damaging an optical fiber also in a side lying position.

[0012]

The purpose of this invention is to provide the living body light measurement art in which measurement with the posture from which analyte became width is possible.

The other purposes and the new feature will become clear with description and the accompanying drawing of this specification along [said] this invention.

[Means for Solving the Problem]

[0013]

It will be as follows if an outline of a typical thing is briefly explained among inventions indicated in this application.

(1) and an optical fiber for an exposure which irradiates analyte with two or more waves of lights derived from a light source, In a measurement probe for living body light measurement which has the holding mechanism which holds an optical fiber for detection which condenses light which passed through inside of said analyte from two or more copy grade, and said optical fiber for an exposure and said optical fiber for detection to a predetermined measuring position, Said holding mechanism accommodates a side contacted by said analyte of said optical fiber for an exposure, and said optical fiber for detection, and took out said optical fiber for an exposure, and said optical fiber for detection from the side of the holding mechanism concerned.

[0014]

In a measurement probe of a statement, said holding mechanism accommodates a core wire part of said optical fiber for an exposure, and said optical fiber for detection in the holding mechanism concerned (2) and (1) which were mentioned above.

[0015]

In a measurement probe, a side contacted by said analyte is formed in a statement by the 1st member that has pliability, and said holding mechanism is formed in (3), (1) which were mentioned above, or (2) at it by the 2nd member in which the outside surface side which is not contacted by said analyte has rigidity rather than said 1st member.

[0016]

In a measurement probe of a statement, protection grooves for said 1st member to protect said optical fiber for an exposure and said optical fiber for detection from a flank part even in an irradiation position or a detection position are formed in (4) and (3) which were mentioned above.

[0017]

Irradiate analyte with (5) and two or more waves of lights derived by an optical fiber from a light source, and. In an organism light measuring device which is provided with a measurement probe which condenses light which passed through inside of said analyte from two or more copy grade, and generates a living body passing beam intensity image of said analyte from said passing beam which condensed, Said measurement probe accommodated a side contacted by said analyte of said optical fiber, and was provided with holding mechanism constituted so that said optical fiber accommodated might be taken out from the side.

[0018]

(6) and (5) which were mentioned above were equipped with a base plate for doubling shape of said measurement probe with shape of said analyte in an organism light measuring device of a statement.

[0019]

According to the means mentioned above, holding mechanism accommodates a side contacted by analyte of an optical fiber for an exposure, and an optical fiber for detection, and. By having composition which takes out an optical fiber for an exposure, and an optical fiber for detection from the side of the holding mechanism concerned, When analyte contacts holding mechanism in a measured region, a tip end part of an object for an exposure and an optical fiber for detection is contacted by measuring point, and. Since it will be protected by holding mechanism, even if an object for an exposure and an optical fiber for detection are the cases where analyte lays a measurement part in holding mechanism of a measurement probe with a posture which became width, it becomes possible to protect an object for an exposure, and an optical fiber for detection. That is, even if analyte is the posture which became width, such as a side lying position, living body light measurement is attained.

[0020]

Since it becomes possible to make an optical fiber crooked in a smaller radius by considering only a core wire part of an optical fiber for an exposure and an optical fiber for detection as composition accommodated in the holding mechanism concerned at this time, it becomes possible to make thickness of holding mechanism thin. Therefore, since it becomes possible to carry out a measurement probe like a pillow and to perform living body light measurement, a burden of analyte under living body light measurement can be reduced. As a result, it becomes possible [that of epilepsy foci, such as epilepsy whose symptoms the sleeping middle class

shows,] to specify correctly.

[0021]

A side contacted by analyte by the 1st member that has pliability especially is formed, and a burden to analyte at the time of measurement can be further reduced by forming the outside surface side which is not contacted by analyte by the 2nd member that has rigidity rather than the 1st member.

[0022]

By forming protection grooves for protecting an optical fiber for an exposure, and an optical fiber for detection even from a flank part to an irradiation position or a detection position in the 1st member, Since a gap of an object for the exposure under measurement and movement and an optical fiber for detection etc. can be prevented, breakage of an optical fiber, etc. can be prevented. As a result, it becomes possible to raise the reliability of a measuring result of living body light measurement.

[Effect of the Invention]

[0023]

It will be as follows if the effect acquired by the typical thing among the inventions indicated in this application is explained briefly.

Since (1), the object for an exposure, and the optical fiber for detection can be protected by holding mechanism, even if it is a case where analyte lays a measurement part in the holding mechanism of a measurement probe with the posture which became width, the object for an exposure and the optical fiber for detection can be protected.

[0024]

Since the object for an exposure and the optical fiber for detection can be protected even if it is a case where (2) and analyte lay a measurement part in a measurement probe with the posture which became width, the living body light measurement of analyte with the posture which became width, such as a side lying position, is attained.

[0025]

Since only the core wire part of (3), the optical fiber for an exposure, and the optical fiber for detection is accommodated in the holding mechanism concerned, it becomes possible to make an optical fiber crooked in a smaller crookedness radius, and thickness of holding mechanism can be made thin.

[0026]

Since a measurement probe can be carried out like a pillow and living body light measurement can be performed by making thickness of (4) and holding mechanism thin, the burden of the analyte under living body light measurement can be reduced.

[0027]

(5) Since a measurement probe can be carried out like a pillow and living body light measurement can be performed, that of epilepsy foci, such as epilepsy whose symptoms the sleeping middle class shows, can also be specified correctly.

[0028]

Since the side contacted by analyte by the 1st member that has (6) and pliability is formed and the outside surface side which is not contacted by analyte by the 2nd member that has rigidity rather than the 1st member is formed, the burden to the analyte at the time of measurement can be reduced further.

[0029]

Since the protection grooves for protecting (7), the optical fiber for an exposure, and the optical fiber for detection even from a flank part to an irradiation position or a detection position are formed in the 1st member, A gap of the object for the exposure under measurement and movement and the optical fiber for detection etc. can be prevented, and breakage of an optical fiber, etc. can be prevented.

[0030]

Since a gap of the object for the exposure under (8), measurement, and movement and the optical fiber for detection etc. can be prevented, the reliability of the measuring result of living body light measurement can be raised.

[0031]

Since the side which touches said analyte of (9) and said measurement probe was equipped with the base plate set by the shape of analyte, Since the shape of said measurement probe is doubled with the shape of the analyte of various forms and an excessive crevice stops arising between the head of analyte, and a measurement probe, a measurement probe can be set up so that sensitivity may become good most.

[Best Mode of Carrying Out the Invention]

[0032]

Hereafter, an embodiment of the invention (EXAMPLE) is described in detail with reference to drawings about this invention.

In the complete diagram for describing an embodiment of the invention, what has the same function attaches identical codes, and explanation of the repetition is omitted.

[0033]

Drawing 1 is a figure for explaining the outline composition of the measurement probe which is the 1 embodiment of this invention.

So that clearly from drawing 1 the measurement probe of this embodiment, It comprises the probe body 101 with which the analyte which is not illustrated is equipped, the optical fiber 102 for an exposure for leading the irradiation light from the main part of a metering device which is

not illustrated to the probe body 101, and the optical fiber 103 for detection for leading the living body light from analyte to the main part of a metering device.

[0034]

Unlike the conventional measurement probe, in the measurement probe of this embodiment, it has the composition that the probe body 101 was beforehand equipped with the object for an exposure, and the optical fiber 102,103 for detection.

Therefore, in the measurement probe of this embodiment, the object for an exposure and the optical fiber 102,103 for detection are arranged by equipping analyte with the probe body 101 in a desired measuring position, respectively. In particular, in the measurement probe of this embodiment, the object for an exposure and the optical fiber 102,103 for detection have composition which may be arranged in a desired measuring position, respectively by laying the head of analyte in the probe body 101. That is, in the measurement probe of this embodiment, it has composition held so that the end of the object for an exposure and the optical fiber 102,103 for detection may become perpendicular to the field of the side contacted in the analyte of the probe body 101. This object for an exposure and the optical fiber 102,103 for detection are taken out from the side of the probe body 101, and they are constituted so that the other end may be connected to the main part of a metering device.

[0035]

In the measurement probe of this embodiment, the probe body 101 comprises the three holder parts 104, and the exposure bed part or detection bed part of three optical fibers is provided in the one holder part 104 at equal intervals. Each holder part 104 has composition connected by the connecting part 105 with a predetermined interval. By having such composition, the weight saving of the measurement probe of this embodiment is carried out, and it can be made to slim down. The interval between each holder part 104 can be kept the optimal by the connecting part 105. The holder part 104 is not limited to three pieces, and it cannot be overemphasized that the one or more number required for the living body light measurement according to a measurement part may be sufficient. The optical fiber arranged to the one holder part 104 is not limited to three, and it cannot be overemphasized that one or more may be sufficient. As shown in drawing 8, it cannot be overemphasized that the two or more holder parts 104 may be formed in one, making into integral construction only electrode-holder covering mentioned later, or making both electrode-holder covering and a holder base into integral construction, in forming the holder part 104 in one especially -- it cannot be overemphasized that any may be sufficient.

[0036]

Drawing 2 is a sectional view for explaining the outline composition of the measurement probe which is the 1 embodiment of this invention, and drawing 3 is a plan for explaining the locating position of the optical fiber in the measurement probe of this embodiment.

in drawing 2 and drawing 3 -- 201 -- a holder base and 202 -- optical fiber protective equipment and 205 show a height adjustment jig, 206 shows an optical fiber, and, as for an optical fiber fixture and 204, electrode-holder covering and 203 show an optical fiber piping slot (protection grooves) 207.

[0037]

So that clearly from drawing 2 in the measurement probe of this embodiment. The holder base 201 arranged at the side contacted in analyte, and the electrode-holder covering 202 arranged at the side which is not contacted with analyte, The optical fiber (the object for an exposure, and the optical fiber for detection) 206 held between the holder base 201 and the electrode-holder covering 202, The optical fiber fixture 203 which holds the optical fiber 206 so that the tip end part of the optical fiber 206 may be arranged in the measuring position of analyte, The height adjustment jig 205 for adjusting the projection amount of the optical fiber 206 from the holder base 201, It comprises the optical fiber protective equipment 204 which bends the optical fiber 206 so that the axis direction may become perpendicular from the side position of the measurement probe concerned about the optical fiber 206 which the axis direction of the optical fiber 206 was allocated along the extending direction of a measurement probe, and was held. However, also in the measurement probe of this embodiment, the optical fiber fixture 203 contains the spring mechanism which holds the optical fiber 206 and does not carry out a slight quantity aggressiveness **** graphic display from the field of the holder base 201 like the conventional optical fiber fixture. Although it is the composition that it was suitable when analyte laid measurement parts, such as a head, in a measurement probe with postures which lay, such as a side lying position, in this embodiment, When analyte moves a head etc., in order to prevent a measurement probe from shifting, it cannot be overemphasized that the belt etc. which make a measurement probe fix to a head may be formed.

[0038]

So that clearly from drawing 3 in the measurement probe of this embodiment. It has the composition that the three optical fibers 206 are allocated every holder part 104, and as the three optical fibers 206 taken in from the side face direction of a measurement probe avoid the optical fiber fixture 203 arranged in each course, they have composition allocated.

[0039]

For example, the optical fiber 206 arranged at the position nearest to the introduction portion of the optical fiber 206, After passing along the side near the screw hole for fixing the holder base 201 and the electrode-holder covering 202 and being perpendicularly crooked with the optical fiber protective equipment 204, it has composition held with the optical fiber fixture 203. After the optical fiber 206 arranged in the mid-position passes along the outside of the optical fiber 206 nearest to an introduction portion and is perpendicularly crooked with the optical fiber

protective equipment 204, it has composition held with the optical fiber fixture 203. The optical fiber 206 arranged on the other hand at the furthest position from the introduction portion of the optical fiber 206, In the two optical fibers 206 mentioned above to the screw hole, after passing along an opposite hand and being perpendicularly crooked with the optical fiber protective equipment 204, it has composition held with the optical fiber fixture 203. Allocation of the optical fiber 206 is not limited to this.

Things cannot be overemphasized.

[0040]

Allocation of each optical fiber 206 which is mentioned above is made by inserting the optical fiber 206 in the optical fiber piping slot 207 formed in the holder base 201. In order to make the flexion rate at the time of making it crooked in the measurement probe of this embodiment, protecting the optical fiber 206 with the optical fiber protective equipment 204 as small as possible at this time, it has the composition that the core wire part which stripped the clothing of the optical fiber 206 is allocated in the optical fiber piping slot 207.

[0041]

In the measurement probe of this embodiment, as the surroundings of the optical fiber 206 from which the tip end part was drawn are surrounded, heights are formed in the holder base 201.

In particular, in the measurement probe of this embodiment, it becomes possible by adjusting the height of these heights, and the projection amount of the optical fiber 206 with the height adjustment jig 205 to adjust thrust in case the tip end part of the optical fiber 206 hits analyte. With this height adjustment jig 205, the movement magnitude of the optical fiber 206 accompanying wearing of the measurement probe to analyte especially, It makes it possible to prevent the excessive burden to the optical fiber 206 by exceeding the movement magnitude of the spring mechanism of the common knowledge with which the optical fiber fixture 203 is provided and which is not illustrated, and to prevent damage to the optical fiber 206. Since the light which hits to the portion which the optical fiber 206 and the epidermis of analyte contact by heights can be covered when the measurement probe has been arranged in analyte, it becomes possible to prevent outdoor daylight from entering during measurement at each optical fiber 206.

[0042]

In the measurement probe of this embodiment. The 1st through hole penetrated to the side contacted by analyte is formed in the holder base 201 from the mating-face side (field of the side doubled with the electrode-holder covering 202), and it has the composition that the optical fiber 206 held with the optical fiber fixture 203 is projected from this 1st through hole. At this time, the 2nd hole that the 1st through hole and medial axis that are penetrated from this mating-face side to the contact side are the same, and a path is larger than this 1st through hole,

and is not penetrated to the contact side is formed by this embodiment. The path of this 2nd hole serves as the same size as the peripheral diameter of the height adjustment jig 205 and the optical fiber fixture 203. By such composition, after inserting the height adjustment jig 205 from the mating-face side, it has the composition of adjusting the projection amount of the height of heights and the optical fiber 206 at the time of inserting the optical fiber fixture 203.

[0043]

In the measurement probe of this embodiment, as shown in drawing 2, the optical fiber fixture 203 is inserted and the crevice used as the space for storing the refracted optical fiber 206 is formed in the position of the electrode-holder covering 202 corresponding to the 1st through hole. At this time, especially in the measurement probe of this embodiment. The thickness of the electrode-holder covering 202 is formed as thinly as possible and lightly, and heights are formed so that the side (portion which contacts a bed etc. at the time of measurement) which opposes only the portion in which a crevice is formed in order to secure sufficient intensity with this mating face may upheave.

[0044]

In the measurement probe of this embodiment, immobilization with the holder base 201 and the electrode-holder covering 202 is made by making four heights and crevices which were established in the box ****.

[0045]

Drawing 4 is a figure for explaining the detailed composition of the holder base which constitutes the measurement probe of this embodiment, and electrode-holder covering. Especially (a) of drawing 4 is a plan of a holder base, and (b) of drawing 4 is a side view from the arrow direction of the white shown in (a) of drawing 4, (c) of drawing 4 is a sectional view in the a-a line shown in (a) of drawing 4, and (d) of drawing 4 is a bottom view from the arrow direction of the white shown in (c) of drawing 4, (e) of drawing 4 is a side view of electrode-holder covering, and (f) of drawing 4 is a bottom view from the arrow direction (mating-face side) of the white shown in (e) of drawing 4.

[0046]

As shown in (a) of drawing 4, it is from the 1st three through holes 401 on the mating-face side of the holder base 201 of this embodiment towards the outlet of the optical fiber 206 shown by a white arrow with the composition that the optical fiber piping slot 207 which became independent, respectively was formed. The 1st comparatively larger heights 402a are formed in the end of the longitudinal direction of the holder base 201 so that clearly from (b) of drawing 4. On the other hand, between the 1st adjoining through hole 401 (middle), the 2nd heights 402b smaller than the 1st heights 402a also with few projection amounts are formed, respectively so that clearly from (c) of drawing 4.

[0047]

As shown in (c) of drawing 4, and (d), it has the composition that the surrounding part 403 projected from the main part of the holder base 201 so that the 1st through hole 401 might be surrounded was formed in the side in contact with analyte. In this embodiment, especially the three surrounding parts 403 have the composition that each became independent, keep a predetermined distance from from [which each adjoins / surrounding / 403], and are formed. As a result, when the measurement probe has been arranged in analyte, each surrounding part 403 will carry out modification according to the shape of the measured region (contact site), and it becomes possible to make vertically or almost vertical the contact angle of the optical fiber 206 contacted by analyte. Since the surrounding part 403 will carry out modification according to the shape of the measured region (contact site), outdoor daylight can be effectively prevented from trespassing upon the part where the optical fiber 206 is contacted.

[0048]

In this embodiment, it supposes that the contour shape of the surrounding part 403 formed in a center section is circular, and contour shape of the surrounding part 403 arranged at the both sides is used as the ellipse form. However, it cannot be overemphasized that the shape of the surrounding part 403 is not what is limited to this.

[0049]

Although it had composition which forms the surrounding part 403 as makes it project from a holder base main part in the holder base 201 of this embodiment, It cannot be overemphasized by forming the crevice which it is not limited to this, for example, is penetrated in the direction of a minor axis of a holder base main part that the surrounding part 403 corresponding to each 1st through hole may be formed.

[0050]

As shown in (e) of drawing 4, the seat part 404 is formed in the position corresponding to the 1st through hole 401 by the side of a mating face (field of the side shown by a white arrow) in the electrode-holder covering 202 of this embodiment. As for this seat part 404, the crevice is formed in the mating-face side of the electrode-holder covering 202. The space for storing and protecting the optical fiber 206 refracted by having such composition in the smaller crookedness radius is secured, and the thickness (height) of a measurement probe is prevented from becoming large. It has composition which prevents the damage accompanying making the optical fiber 206 crooked. Therefore, in this embodiment, the size of the seat part 404 is a grade which damage by crookedness of the optical fiber 206 does not produce, and it is formed so that the size may serve as the minimum.

[0051]

By absorbing movement of the optical fiber 206 by the tip end part of the optical fiber 206

moving by the crooked part accommodated in the seat part 404, when analyte is equipped with the measurement probe of this embodiment, The burden placed on the optical fiber 206 is reduced greatly, and it has the composition of preventing breakage.

[0052]

The inner skin shape of the stowage 404 is formed in the same size and shape as outer peripheral surface shape of the optical fiber fixture 203, and this stowage 404 is functioning also as holding mechanism for holding the optical fiber fixture 203 so that it may mention above. When analyte is equipped with the measurement probe of this embodiment by considering it as such shape, the position of the optical fiber fixture 203 is prevented from shifting, and it is considered as the composition that an exact measuring result is obtained.

[0053]

As shown in (f) of drawing 4, in the electrode-holder covering 202 of this embodiment. The slot 405 along which the refracted optical fiber 206 passes is formed in the end of the seat part 404, and it has the composition of holding the optical fiber 206 once refracted in the electrode-holder covering 202 side from the optical fiber piping slot 207. The extending direction of this slot 405 is formed so that it may become the same as the optical fiber piping slot 207. The optical fiber 206 is made perpendicularly crooked from the extending direction of a measurement probe by forming such a slot 405 in the minimum space, and the burden placed on the optical fiber 206 is made into the minimum.

[0054]

The 1st and 2nd crevices 406a and 406b are formed in the electrode-holder covering 202. The checking and verifying of this the 1st crevice 406a and 2nd crevice 406b are carried out to the 1st heights 402a and 2nd heights 402b, respectively.

[0055]

Here, in order to set the probe body 101 by the head shape of analyte, it is useful to make the probe body 101 paste and to reinforce the base plate 601. The example is shown in drawing 5. The sectional view and drawing 5 (c) as which the figure which looked at the probe body 101 in which drawing 5 (a) attached the base plate 601 from the direction of the probe body 101, and drawing 5 (b) regarded drawing 5 (a) from the direction of an arrow are a perspective view when the electrode-holder covering 202 is demounted. In drawing 5, the probe body 101 is fixable in the form fit for the head of the analyte of almost spherical shape by constituting the base plate 601 from hard construction material, such as a plastic, and doubling the curvature with the head shape of analyte beforehand. By this, since an excessive crevice stops arising between the head of analyte, and the probe body 101, the probe body 101 can be set up so that sensitivity may become good most.

[0056]

Although the graphic display has not been carried out, a rail is formed in the analyte side of the probe body 101, and the base plate 601 can be put on a rail. since the various-shaped base plate 601 can be made by this to put between the soft probe body 101, according to shape with various heads of analyte, the probe body 101 is transformed and attached the optimal -- it is possible.

[0057]

For example, the probe body 101 is fixable to a head in the form which fitted the complicated-shaped head most by making the base plate 601 of each shape put between the six probe bodies 101, and arranging to every place of the head of analyte. The example is shown in drawing 6. Drawing 6 (a) binds tight and fixes the figure and drawing 6 (b) which attached the six probe bodies 101 to the head of analyte with the ** fastener 701 with a bundle from on the state of drawing 6 (a). Thereby, the six probe body 101 whole can be prevented from separating. Under the present circumstances, it is combining that hole and projection for the base plate comrade of the probe with which one side's formed the projection and a hole and the other side adjoined each other to the portion protruded from the probe body 101 of the base plate 601, although the graphic display has not been carried out, The probe with which the probe body 101 comprises three is formed in the right-hand side of the head of analyte, and each left-hand side. Since connection by those holes and projections can also be made smooth, what the probe body 101 separates from independently is lost. Although the base plate 601 is made into what has the separate holder base 201 in this embodiment, it is really good also as molding in the base plate 601 and the holder base 201. What is necessary is just to use elastic cloth, the balloon of the air injection of ring shape, etc. as construction material of the ** fastener 701 with a bundle.

[0058]

Drawing 7 is a figure for explaining the outline composition of the organism light measuring device which used the measurement probe of this embodiment.

in drawing 7 -- 501 -- a light source part and 502 -- a light module and 503 -- an oscillation part and 511 -- a photo-diode and 512 -- a lock in amplifier module and 516 -- the Records Department and 519 show a treating part, 520 shows an input output section, and, as for a control section and 518, an A/D converter and 517 show an image generation part 521.

[0059]

In drawing 7, the light source part 501 comprises the four light modules 502. Each light module 502 is visible, or comprises two semiconductor lasers which emit two waves of lights (two or more wavelength, for example, 780 nm, and 830 nm) all over the wavelength area of ******, respectively and which are not illustrated. Two waves of these values are not limited to 780 nm and 830 nm, and a wavelength number is not limited to two waves, either. About this light source part 501, a light emitting diode may be used instead of a semiconductor laser. All the semiconductor lasers contained in this light source 501 are modulated by the oscillation part

503 which comprises an oscillator in which oscillating frequency differs, respectively, respectively. However, although Embodiment 1 shows the case of the analog modulation by a sine wave as these abnormal conditions, it is not limited to this and the digital modulation by the square wave of a time interval different, respectively may be used. The light module 502 is equipped with the optical fiber coupler which makes the light with a wavelength of 780 nm and 830 nm emitted from each semiconductor laser introduce into one optical fiber (optical fiber 102 for an exposure) and which is not illustrated.

[0060]

Therefore, the light which mixed 2 wavelength light emitted from the light source part 501 is irradiated by the analyte which serves as an irradiation object from the tip end part of the four optical fibers 102 for an exposure connected to each light module 502 and which is not illustrated. At this time, it is fixed with the probe body 101 and each optical fiber 102 for an exposure irradiates a position different, respectively. However, at this embodiment, the tip end part of the optical fiber 102 for an exposure and the optical fiber 103 for detection is arranged on a tetragonal lattice by turns inside the probe body 101.

[0061]

It is condensed, respectively by the five optical fibers 103 for detection allocated by the probe body 101, and is detected with the photo-diode 511 which is a photodetector connected to the other end of each optical fiber 103 for detection, the light, i.e., the living body passing beam, which passed the light scattering reflector. The avalanche photodiode of the common knowledge which can realize optical high sensitivity measurement as this photo-diode 511 is desirable. As a photodetector, as long as it is optoelectric transducers, such as a photo-multiplier, other things may be used.

[0062]

After a living body passing beam is changed into an electrical signal (living body passing beam strength signal) with these photo-diodes 511, it is the alternative detector circuit 512 of a modulating signal, for example, the lock in amplifier module which comprises two or more lock in amplifiers, The modulating signal corresponding to an irradiation position and wavelength is detected selectively. At this time, the modulating signal outputted from the lock in amplifier module 512 is divided into the living body passage strength signal corresponding to wavelength and an irradiation position, respectively. However, in this embodiment, since measurement in the measuring position of 512 is performed using two waves of lights, the signal number which should be measured is set to 24. Therefore, in the lock in amplifier module 512 of this embodiment, a total of 24 lock in amplifiers which are not illustrated are used. However, when a digital modulation is used, a digital filter or a digital signal processor is used as modulating-signal detection.

[0063]

The living body passing beam strength signal by which an analog output is carried out is changed into a digital signal from the lock in amplifier module 512 by A/D converter (analog-to-digital converter) 516 of 24 channels, respectively. Each digital signal is wavelength and a living body passing beam strength signal for every irradiation position. These measurement is controlled by the control section 517.

[0064]

The living body passing beam strength signal changed into the digital signal is recorded at the Records Department 518. The living body passing beam strength signal recorded on the Records Department 518 is read in the treating part 519, and in this treating part 519 in general living body light measurement, Oxygenation hemoglobin concentration change and deoxygenation hemoglobin concentration change accompanying the brain activity called for from the living body passing beam strength signal of each detection position, Furthermore these hemoglobin concentration total amount is calculated, it is displayed on the display screen which the input output section 520 does not illustrate as information with the passage of time on two or more measuring positions, or the information with the passage of time on two or more measuring positions is stored in the Records Department 518. About the method of calculating oxygenation, deoxygenation hemoglobin concentration change, and a hemoglobin concentration total amount from the living body passing beam strength signal of each detection position, since it is common knowledge, detailed explanation is omitted.

[0065]

At this time, with the organism light measuring device of this embodiment, the end of the object for an exposure and the optical fiber 102,103 for detection is incorporated into the probe body 101, and it is crooked so that it may become vertical to analyte epidermis inside the probe body 101. Therefore, establishment light measurement is attained, without damaging a measurement probe (especially the object for an exposure and the optical fiber 102,103 for detection), even if analyte posture is the case of sideways [, such as a side lying position,], i.e., the posture which went to sleep.

[0066]

As a result, in the living body light measurement using the conventional measurement probe, the living body light measurement which attains to the impossible long time that rest of sleep etc. is needed for analyte is attained. Therefore, in the former, identification can become possible [identifying a position with an exact epilepsy focus of the difficult sleep nature, etc.], and can raise treatment results substantially.

[0067]

As mentioned above, as for this invention, although the invention made by this invention person

was concretely explained based on said embodiment of the invention, it is needless to say for it to be able to change variously in the range which is not limited to said embodiment of the invention, and does not deviate from the gist.

[Brief Description of the Drawings]

[0068]

[Drawing 1]It is a figure for explaining the outline composition of the measurement probe which is the 1 embodiment of this invention.

[Drawing 2]It is a sectional view for explaining the outline composition of the measurement probe which is the 1 embodiment of this invention.

[Drawing 3]It is a plan for explaining the locating position of the optical fiber in the measurement probe of this embodiment.

[Drawing 4]It is a figure for explaining the detailed composition of the holder base which constitutes the measurement probe of this embodiment, and electrode-holder covering.

[Drawing 5]It is a figure showing the example which installed the base plate in the measurement probe of this embodiment.

[Drawing 6]It is a figure showing the example which fixed to the head of analyte six measurement probes which installed the base plate of this embodiment.

[Drawing 7]It is a figure for explaining the outline composition of the organism light measuring device using the measurement probe of this embodiment.

[Drawing 8]It is a figure for explaining the outline composition of the measurement probe which are other embodiments of this invention.

[Description of Notations]

[0069]

101 -- A probe body, 102 -- The optical fiber for an exposure, 103 -- The optical fiber for detection, 104 [-- Electrode-holder covering,] -- A holder part, 105 -- A connecting part, 201 -- A holder base, 202 203 -- An optical fiber fixture, 204 -- Optical fiber protective equipment, 205 -- Height adjustment jig, 206 -- An optical fiber, 207 -- An optical fiber piping slot, 401 -- The 1st through hole, 402a [-- Seat part,] -- The 1st heights, 402b -- The 2nd heights, 403 -- A surrounding part, 404 405 [-- Light source part,] -- A slot, 406a -- The 1st crevice, 406b -- The 2nd crevice, 501 502 -- A light module, 503 -- An oscillation part, 511 -- Photo-diode, 512 [-- The Records Department, 519 / -- A treating part, 520 / -- An input output section, 521 / -- An image generation part, 601 / -- A base plate, 602 / -- A hole, 701 / -- ** fastener with a bundle] -- A lock in amplifier module and 516 -- An A/D converter, 517 -- A control section, 518

[Claim(s)]

[Claim 1]

An optical fiber for an exposure which irradiates analyte with two or more waves of lights derived from a light source, In a measurement probe for living body light measurement which has the holding mechanism which holds an optical fiber for detection which condenses light which passed through inside of said analyte from two or more copy grade, and said optical fiber for an exposure and said optical fiber for detection to a predetermined measuring position,

A measurement probe, wherein said holding mechanism accommodates a side contacted by said analyte of said object for an exposure, and an optical fiber for detection and takes it out from the side of the holding mechanism concerned.

[Claim 2]

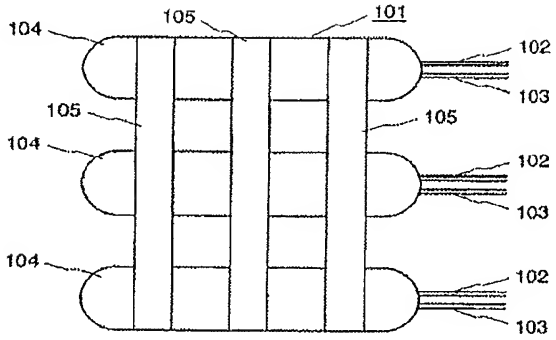
In an organism light measuring device which is provided with a measurement probe which analyte is irradiated with two or more waves of lights derived by an optical fiber from a light source, and condenses light which passed through inside of said analyte from two or more copy grade, and generates a living body passing beam intensity image of said analyte from said passing beam which condensed,

An organism light measuring device, wherein said measurement probe is provided with holding mechanism constituted so that a side contacted by said analyte of said optical fiber might be accommodated and said optical fiber accommodated might be taken out from the side.

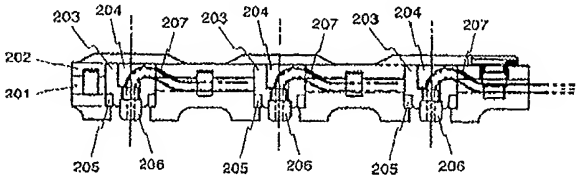
[Claim 3]

The organism light measuring device according to claim 2 equipping a side which touches said analyte of said measurement probe with a base plate for doubling shape of said measurement probe with shape of said analyte.

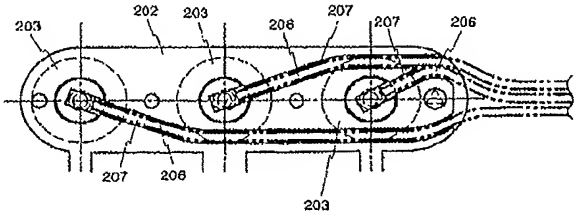
[Drawing 1]



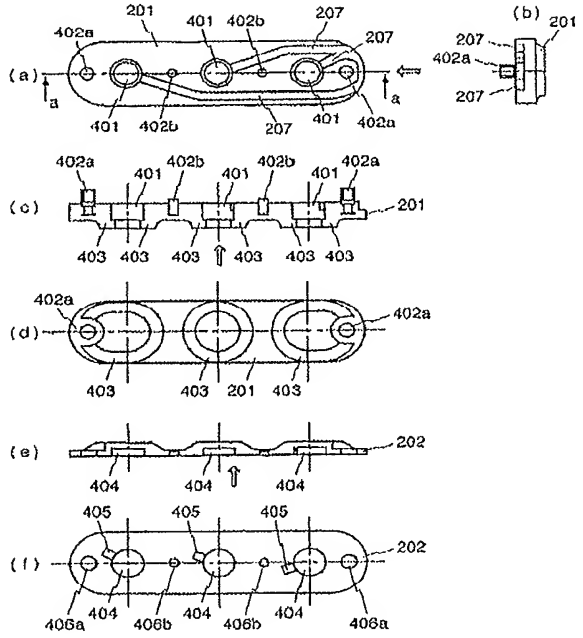
[Drawing 2]



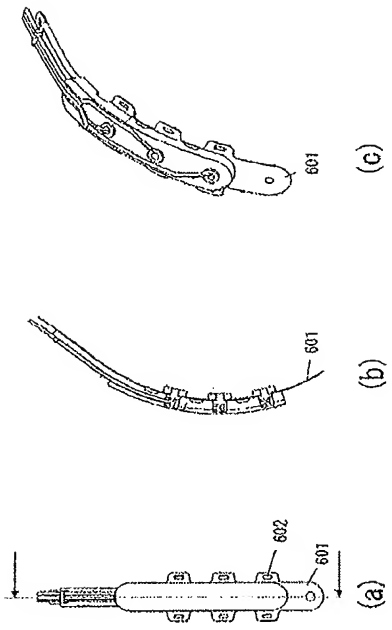
[Drawing 3]



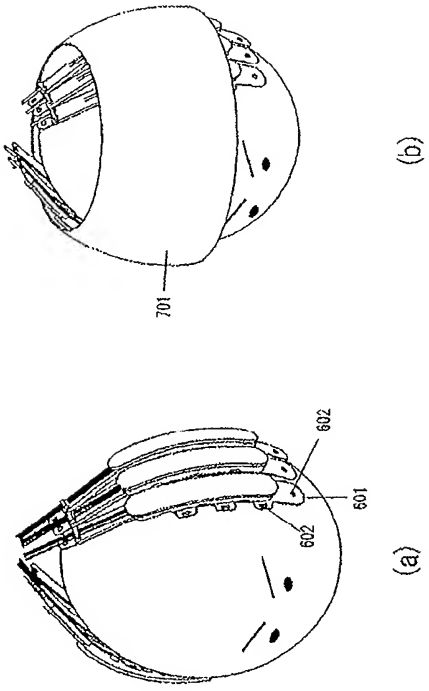
[Drawing 4]



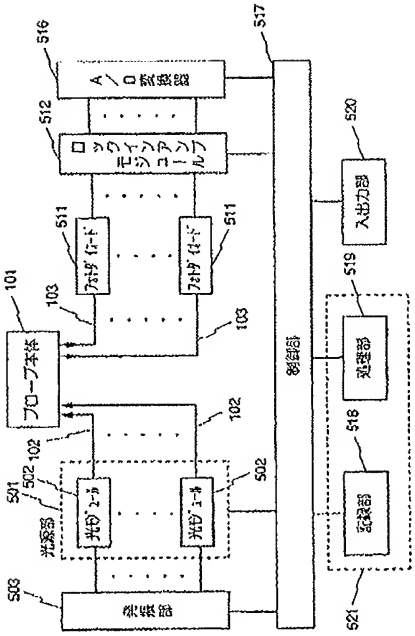
[Drawing 5]



[Drawing 6]



[Drawing 7]


516
517
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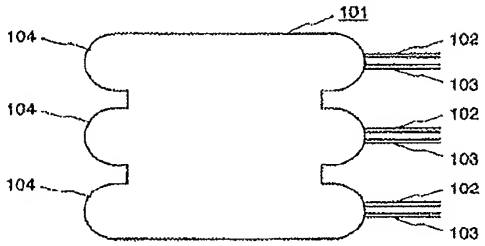
光源部
503
521

[Drawing 8]


101
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102
103

(57)Abstract:
PROBLEM TO BE SOLVED: To provide a technique capable of measuring a subject in a laid posture.
SOLUTION: In this measuring probe for vital ray measurement having an irradiation optical fiber for emitting a plurality of wavelengths of light guided from a light source to the subject, a detection optical fiber for converging the light transmitted through an inside of the subject from a plurality of portions, and a holding means for holding the irradiation optical fiber and the detection optical fiber in a prescribed measuring position, and the holding means stores sides abutting to the subject of the irradiation optical fiber and the detection optical fiber and allows taking-out thereof from a side face of the holding means.